

SITE: FL Phosphate Initiative

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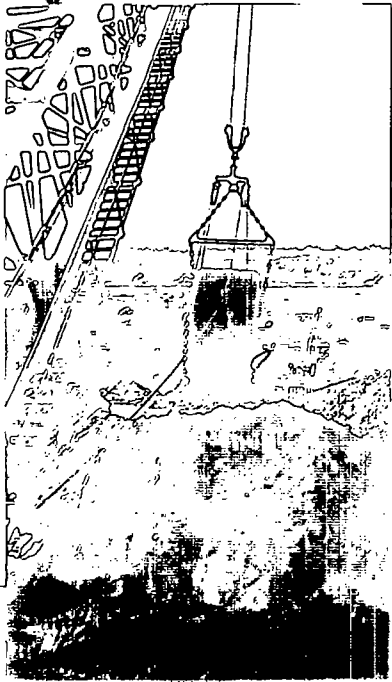
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# Phosphate Land Reclamation

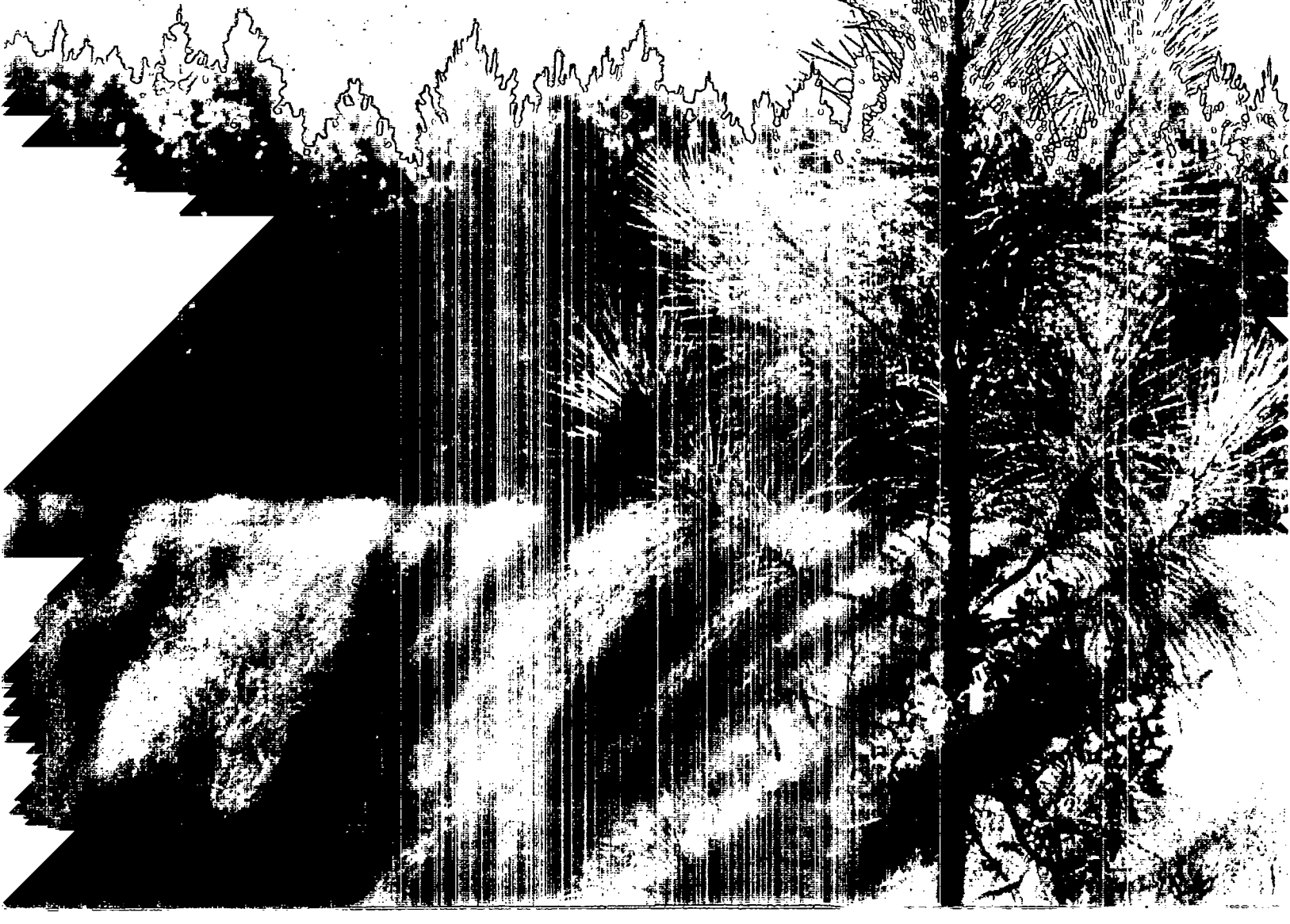
## Reflections




10518299



*From dragline mining  
(left), to land contouring  
(below), to the finished  
project, reclamation has  
transformed mined lands  
into productive wildlife  
habitats as well as  
potential economic uses.*





## Foreword

The story of Florida's phosphate industry begins with the discovery of phosphate rock in 1881<sup>1</sup> and tales of pick-and-shovel miners in the bustling mining towns of Central Florida. The rapidly growing world needed phosphorus to enrich the crops and animals that, in turn, nourished its people. Florida, with one of the world's richest deposits of this vital mineral, prospered as demand for fertilizer increased. Even today, the productivity of our employees and the efficiency of our operations allow the industry here to be competitive with other regions of the world where phosphate rock is mined under different regulatory constraints.

Florida's natural wealth—plenty of phosphate and plenty of land—was largely taken for granted in the early days. There were no pressing needs to reclaim and reuse mined land. But as the population and the industry grew, we recognized the value of reshaping some mined land for recreation and development.

Eventually more and more voluntary reclamation took place. The nature of this work differed from company to company. But the rate of reclamation wasn't fast enough to demonstrate that the industry would voluntarily reclaim all its mined land. As a result, in 1975 the Florida legislature passed the mandatory reclamation law. In these statutes, the state recognizes that mining is a temporary land use<sup>2</sup> and requires that land be reclaimed within specified deadlines<sup>3</sup>.

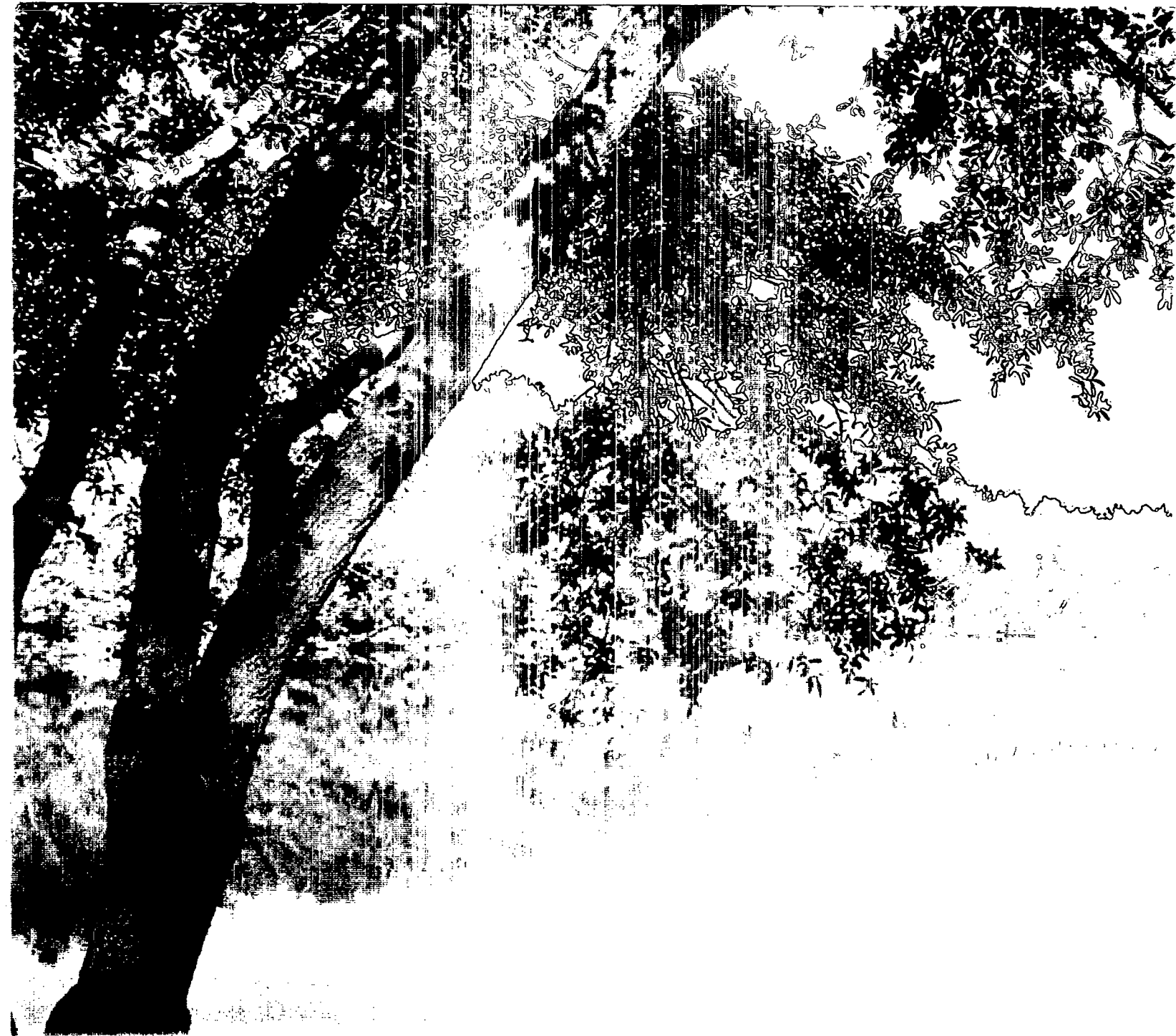
This legislation launched a new era in the phosphate industry. Companies began to reclaim land in a more consistent and timely manner. Knowledge and experience increased

resulting in reclamation that has received national recognition for its quality and scope. However, there is a keen awareness that the science of reclamation is still evolving, steered by changing technology, new requirements and a growing spirit of cooperation.

An example of this cooperative spirit is found in the work of the Florida Institute of Phosphate Research (FIPR). This independent state agency, administered by the University of South Florida, funds reclamation research conducted by consultants and academicians, as well as in-house staff. These researchers develop proposals in cooperation with members of the environmental community, the operating companies and regulatory agency staff.

The results of these studies build on the existing store of reclamation knowledge and provide direction for further cooperation in establishing research priorities. FIPR funding comes from a portion of the phosphate rock severance tax created by the 1975 legislation requiring mandatory reclamation. The reclamation of land mined prior to 1975 has been, and continues to be, funded by a separate portion of the severance tax receipts.

As member companies of the Florida Phosphate Council, we are proud of our role in providing phosphate fertilizers and animal feed supplements for a rapidly growing world population. We are equally proud of adhering to our Guiding Principles<sup>4</sup> that include responsibly reclaiming the land after mining. The pages that follow offer a glimpse of the significant reclamation progress being achieved.



## Reflections on Reclamation

People were the first beneficiaries of voluntary land reclamation—a golf course constructed in 1929. By the late 1940s, as post-war Florida began to feel the pressures of more people and development, the phosphate industry and new owners of mined lands began to reclaim more land.<sup>5</sup> Mined landscapes began to take on a new appearance as sites near population centers were reclaimed for agricultural, commercial, recreational and residential uses.

By 1970, nearly 20,000 acres had been reclaimed.<sup>6</sup> Some of today's popular recreational areas in Polk and Hillsborough counties are on mined lands that reflect the reclamation handiwork of both nature and people. These properties that were sold or donated for public use include Tenoroc State Reserve, Saddle Creek Park, Peace River Park, Medard Park & Reservoir and Christina Park.

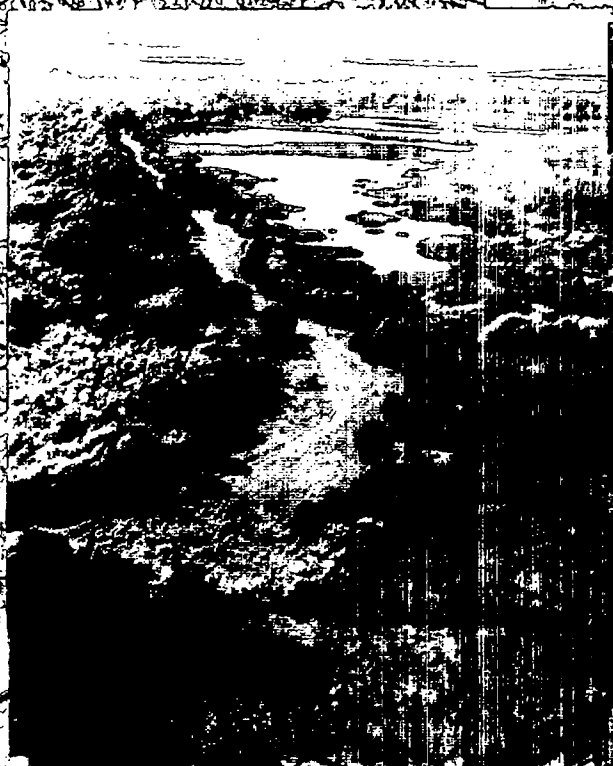


***Land reclaimed to form a combination of lakes, wetlands and uplands provides wildlife habitat and recreational opportunities.***

Not all mined lands were in the path of commercial development. The reclamation of lands for non-economic reasons such as wildlife habitat and recreation was also envisioned by the public, the industry and the state of Florida. Changes to state law, requiring all mined lands to be reclaimed and specifying uniform standards, were seen as the best means to accomplish this objective.

When Florida's mandatory reclamation law went into effect on July 1, 1975, whether to reclaim was no longer in question. Instead, the question became how best to reclaim the

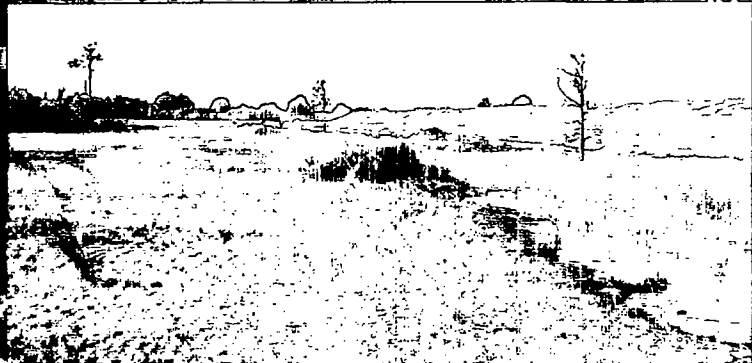
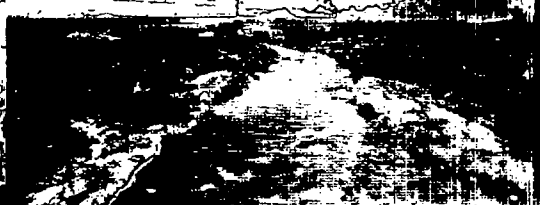
mined lands. As a result of the legislation, state regulations were adopted that provided guidelines and standards for the mandatory reclamation program and addressed the design of reclaimed land including hydrology, topography, revegetation and the timing of reclamation. Since then, the industry has received many awards for transforming mined lands, including those from pre-1975 mining, into productive lake, wetland, upland and scrub wildlife habitats. Other mined areas are transformed into a multitude of economically viable land uses.




Open water, forested wetlands and marsh define this productive wetland ecosystem established on land mined in the late 1970s.



A forested stream project takes shape as land is contoured (far left photo), then planted (bottom photo). The large background photo shows the maturing project after 13 years of growth.







*White submerged runners sprout from newly planted native sawgrass (above), increasing density of this rich wetlands ecosystem (background photo).*

## Functioning Wetlands

More than 15,000<sup>7</sup> acres of thriving reclaimed wetlands testify to our industry's advances in constructing these systems that are so vital to the quality of water resources and to the wildlife that depends on them for food and shelter.

Several wetland reclamation projects were underway by the late 1970s as companies hastened to gain the experience and skills that would demonstrate their ability to construct these important environments. Large-scale field trials examined ways to build self-sustaining wildlife habitats that would also complement and enhance existing natural systems. Earth-moving techniques were studied to find the best ways to provide conditions for specific habitats. Hydrologists working with reclamation teams improved their ability to predict the moisture conditions in a reclaimed wetland and to place plants according to their moisture needs in order to ensure their survival.

Researchers also developed techniques to increase plant diversity and to jump-start development of new wetlands. An example is

preserving organic topsoil, rich with seeds and roots, from wetlands approved for mining, then spreading it over newly contoured reclamation sites.

Wetlands reclamation has made significant progress and is being conducted successfully using today's technology. Nonetheless, industry and agency researchers continue to learn ways to enhance these important systems. Today's emphasis is on expanding the environmental and habitat values of these reclaimed systems.

As plans are conceived and developed, reclamationists study the composition of soils and pre-mining and post-mining drainage patterns. Trees and plants are carefully chosen to provide diversity and necessary food and shelter for wildlife.

Wetland systems being reclaimed include:

- Streams
- Seepage Wetlands
- Bayheads
- Forested Wetlands
- Herbaceous Wetlands


## Scrub. Uplands. And the Bigger Picture.

Building wetlands is just one part of the reclamation picture. Other advances are evident throughout Florida's phosphate regions in the creation of uplands. This includes reclamation of the rare sandy scrub environments.

In the mid-1980s, research led to creation of the industry's first large-scale scrub habitat. Today, Florida scrub jays from a preserved area nearby are feeding and nesting in this constructed habitat. Gopher tortoises, too, are making themselves at home among the sand live oak, cactus and rosemary. Bald eagles, bobcats, gray foxes and other wildlife frequent

this site. The project may become part of an extensive habitat network in Central Florida. Five years of monitoring by the Florida Game and Freshwater Fish Commission (now the Florida Fish and Wildlife Conservation Commission) found the project unprecedented in the extent and quality of its emerging habitat.<sup>8</sup>

More recently, another focus of our industry's reclamationists has been the development of techniques that will demonstrate their ability to successfully reclaim pine flatwoods, an important wildlife habitat. Several research and large-scale projects have been undertaken.



*A wildlife conservation area (large photo), a citrus grove and a pine plantation (inset photos) illustrate diverse kinds of uplands reclamation.*



*Gopher tortoises are among the protected species that depend on sandy, dry scrub environments. Tortoises are relocated to these reclaimed scrub areas from sites that will be mined.*



*Industry reclamationists examine shrub and ground cover in reclaimed scrub habitat.*

*A Florida scrub jay makes itself at home in a maturing scrub on reclaimed land.*



Public recreation parks, residential developments,  
golf courses and nature parks are a few of the  
diverse uses of previously mined land.

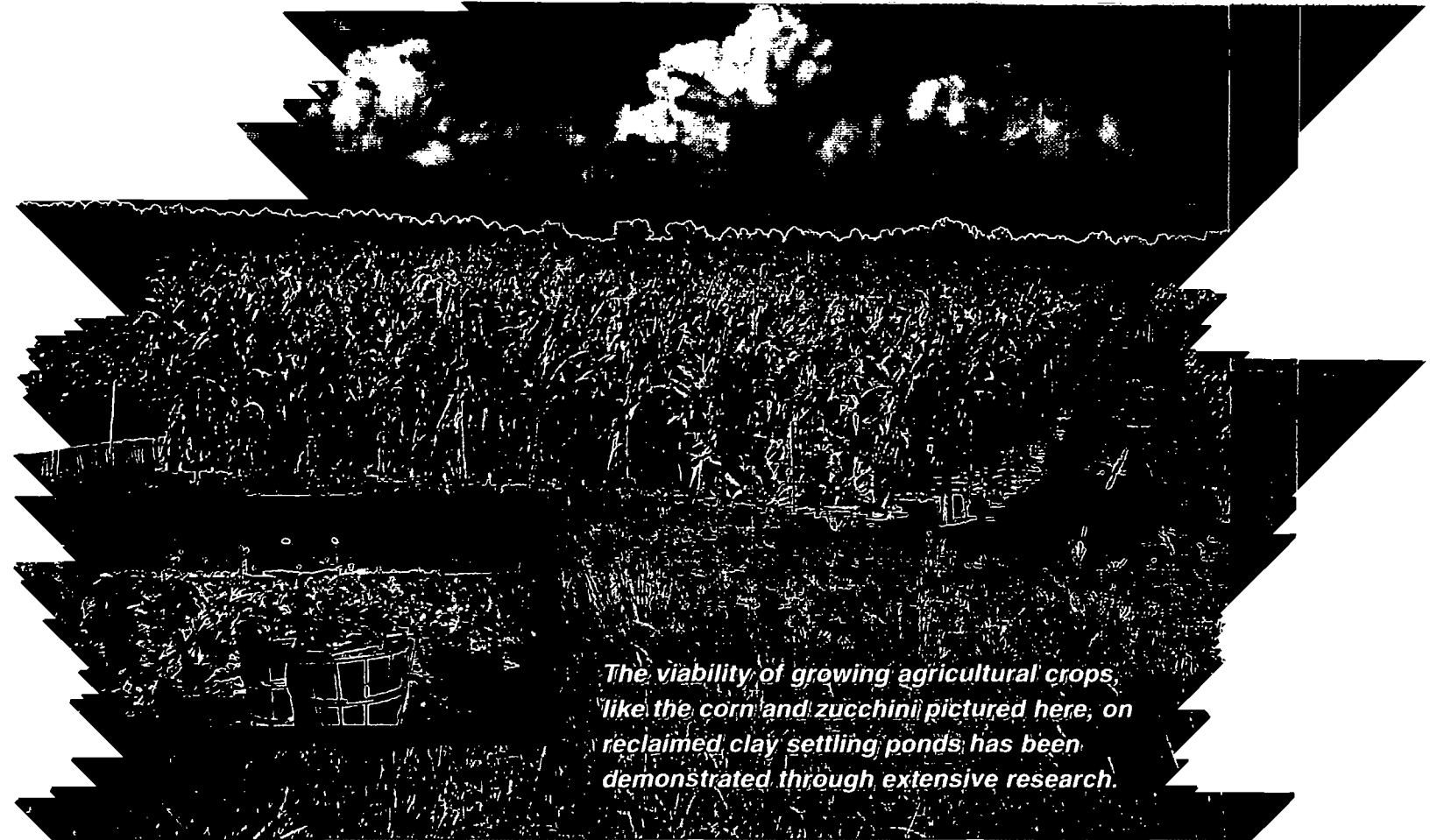
*Reclaimed wetlands and aquatic systems provide habitat for waterfowl as well as being renowned for great fishing.*



## Diversity

Land mined for phosphate rock is reclaimed for many useful purposes. The following land uses are found on reclaimed lands:

- Wetlands
- Lakes
- Uplands
- Wildlife habitat
- Pasture
- Agriculture
- Tree farms
- Parks
- Golf courses
- Hunting and fishing areas
- Custom home developments
- Industrial sites
- Power plants and utility corridors
- Commercial development
- Highways
- Public buildings



*The viability of growing agricultural crops, like the corn and zucchini pictured here, on reclaimed clay settling ponds has been demonstrated through extensive research.*

## Clay Settling Ponds RECLAIMED

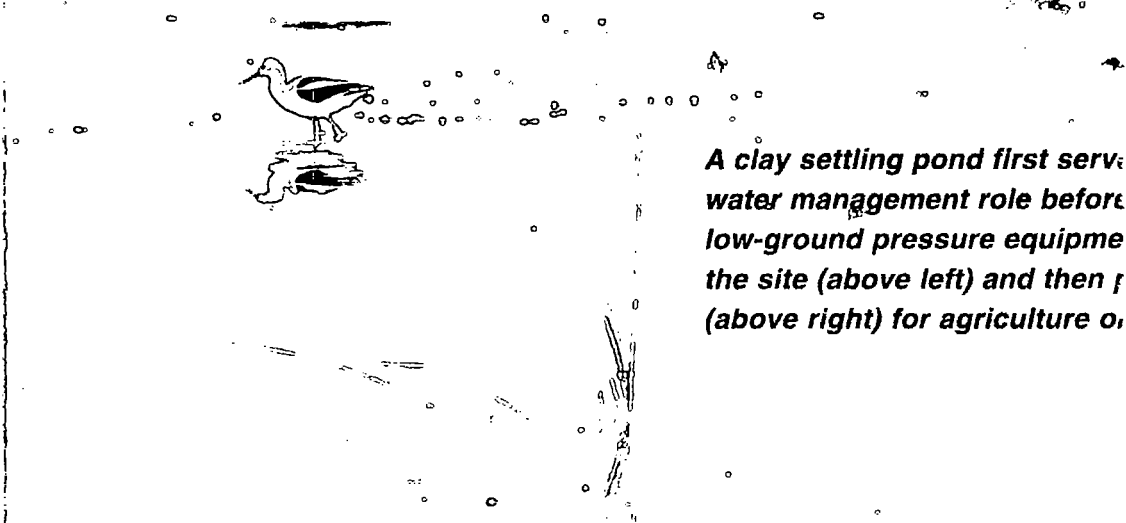
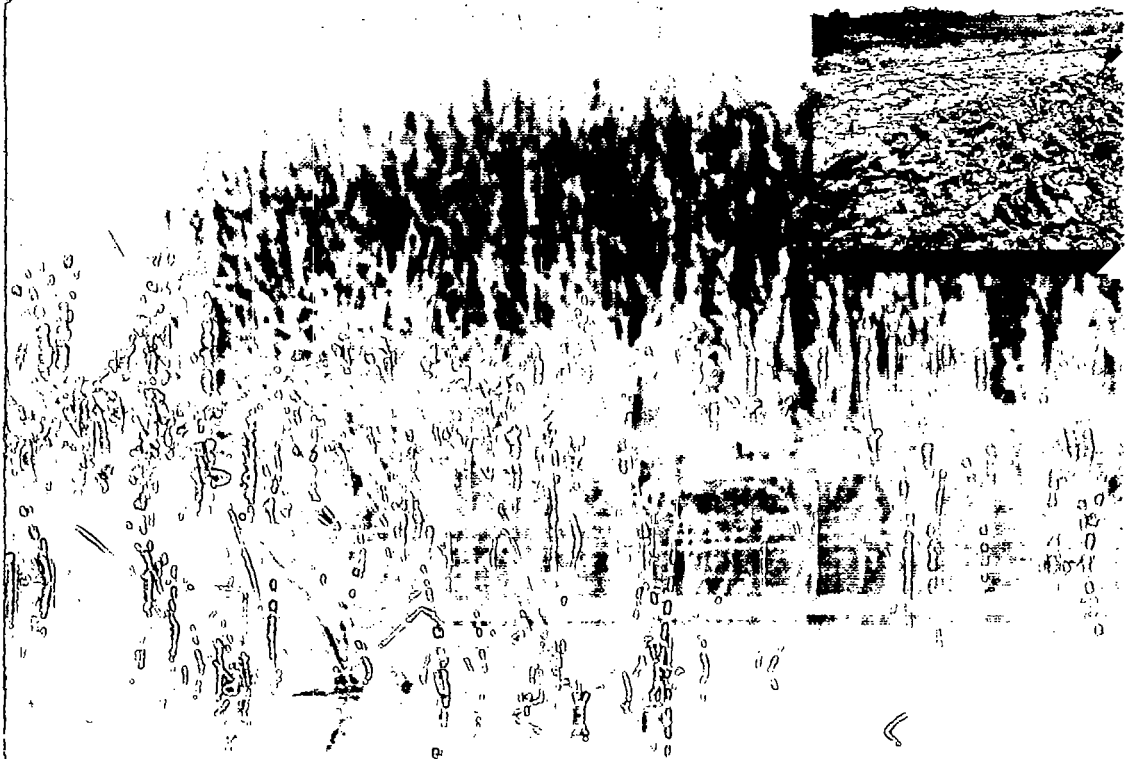
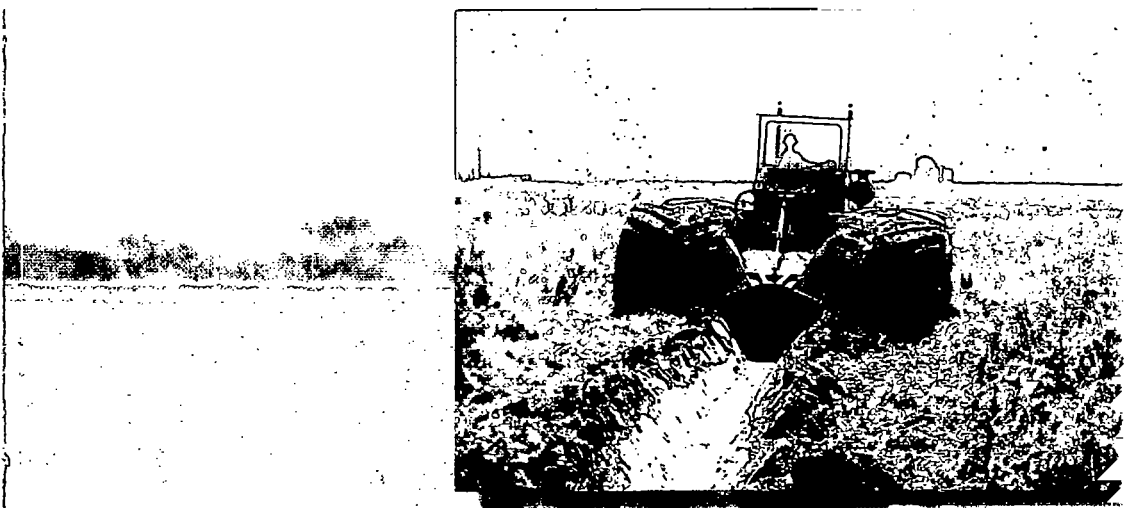
Clay settling ponds are vital to mining phosphate rock that comes from the ground in a mixture with clay and sand. After separating the clay and sand from the phosphate at nearby plant facilities, the clay, mixed with water, is routed to the settling ponds. Clay settling ponds need to be kept active as long as possible to maximize clay storage in order to minimize the acreage occupied. While in use, the ponds play a vital role in our ability to reduce ground water usage by providing water storage. This allows us to meet 95 percent of our water needs with recycled water.

As recently as the early 1980s, reclamation of a settling pond was a slow process, requiring 10 to 15 years for the clays to dry sufficiently

before reclamation could begin. Today, with the use of specially developed machinery and effective ditching techniques, the drying process can be accomplished within three to five years after the clay settling areas are filled.

The ponds have been typically reclaimed for pasture, but wetland habitats can be established when properly designed. They are also suitable for other agricultural uses. Ten years of research funded by the Florida Institute of Phosphate Research demonstrated that a variety of row crops, citrus, native trees, sod and ornamentals can be grown on the nutrient-rich clay.<sup>9</sup>

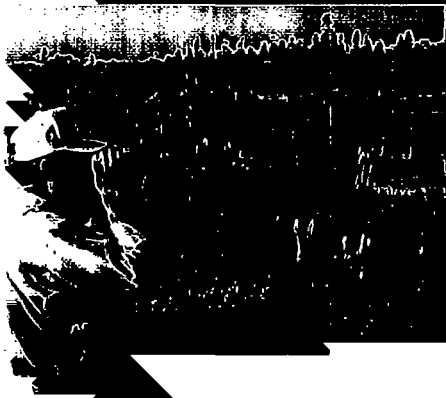




**A clay settling pond first served a water management role before low-ground pressure equipment was used to level the site (above left) and then for agriculture (above right) for agriculture or**



A hawk tries  
out a tree snag  
“planted” by  
reclamationists  
on a new  
project.



a popular pastime  
on phosphate land.

## Reclamation Benefits

enced, reclaimed  
parcels to projects  
s designed to  
reserved,  
primary focus of  
, the habitat  
inected habitat  
incorporated into


oured and  
these areas. To  
ore projects  
install nesting  
e snags and

Studies show that reclaimed habitat has a high capacity to attract and retain wildlife.

Researchers have identified 348 species of birds, mammals, reptiles, amphibians and fish using reclaimed habitats on phosphate-mined land in Central Florida alone. These same researchers identified 324 species using unmined habitats within or near the Central Florida mining district.<sup>10</sup>

Numbers alone do not tell the whole story. While significant wildlife use occurs on reclaimed land, some species will take time to reestablish. We continue to investigate ways to encourage the return of more of the original species to our reclaimed sites.





*Enhancements to  
reclaimed wetlands  
encourage use by  
numerous waterfowl.*

*Reclaimed land is  
frequently used by  
protected sandhill cranes.*

*Mature trees in the path of mining are cut and then  
set in reclaimed sites to provide feeding and  
nesting habitat for woodpeckers.*

Reclamation scientists  
examine seed development in a  
reclaimed sawgrass wetland.



A reclamation team  
evaluates techniques  
for establishing bay  
swamps on mined land.



## Learning. Refining. Looking Ahead

Early trial and error, along with subsequent years of experience, science and the power of nature itself, have given a solid foundation for moving forward with quality land reclamation.

We are fulfilling our commitment to responsible land reclamation. Reclamation plans are developed that balance the needs and desires of counties, community groups, environmentalists and land owners, while meeting regulatory requirements. We continually seek input on these plans from these groups. As a result, post-reclamation land is suitable for a wide variety of uses from agriculture to residential to commercial to wildlife habitat areas that may be deed restricted so that their character cannot be changed by future owners.

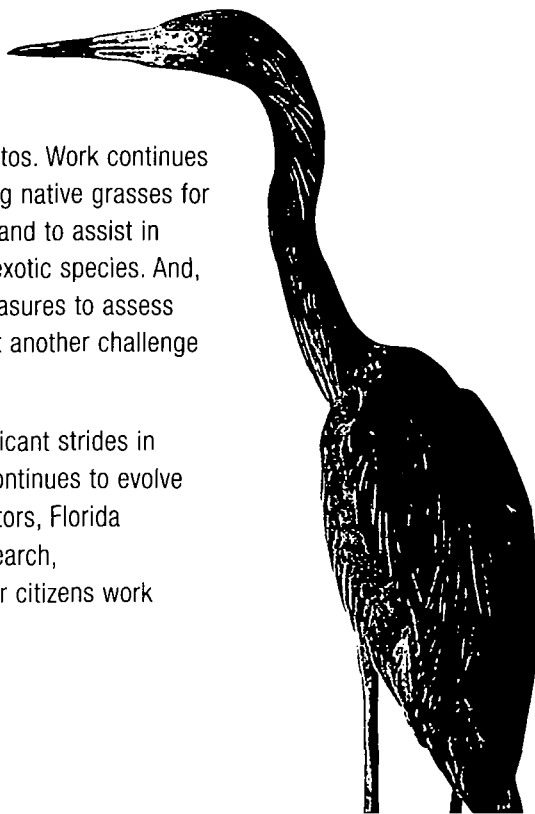
Steady progress has marked the first quarter-century of mandatory reclamation. Finding solutions to reclamation issues continues. Reclamation of natural systems is a continuing learning process. Recently, for example, we have been exploring techniques to reclaim uplands to pre-mining landscapes that have a diversity of native plants, including pines and palmettos. Work continues on establishing and growing native grasses for revegetating upland areas and to assist in ongoing efforts to control exotic species. And, developing appropriate measures to assess reclamation progress is yet another challenge being addressed.

While we have made significant strides in reclamation, the science continues to evolve as industry leaders, regulators, Florida Institute of Phosphate Research, environmentalists and other citizens work

together to achieve the vision of economic and environmental sustainability.

Time itself will ultimately confirm reclamation's effectiveness. Meanwhile, research will continue, more progress will be made, issues will arise and solutions will be found.

As we begin a second 25 years of mandatory land reclamation, we do so with a steady commitment to responsible reclamation and land management, from the start of mining to the diverse landscapes which may be transferred or sold for wildlife habitat, agriculture or commercial use. Ultimately, it is reclamation that makes mining a temporary land use and puts mined lands back into productive environmental and economic uses.



# Recognition

## Corporate Conservation Council of the National Audubon Society

|  |      |
|--|------|
| Morrow Swamp - Environmental Achievement Award                   | 1987 |
| Peace River Floodplain Habitat - Environmental Achievement Award | 1988 |

## Tampa Bay Regional Planning Council

|  |      |
|--|------|
| Hall's Branch Habitat - Future of the Region Award for the Environment | 1993 |
|--|------|

## Florida Native Plant Society

|                                      |      |
|--------------------------------------|------|
| Hal Scott Wildlife Conservation Area | 1994 |
| Fort Green Park                      | 1995 |

## National Association of State Land Reclamationists

|                                      |      |
|--------------------------------------|------|
| Morrow Swamp                         | 1987 |
| Hal Scott Wetland                    | 1993 |
| Hookers Prairie Wetland              | 1996 |
| West Noralyn Scrub Habitat           | 1998 |
| Non-Coal Reclamation - White Springs | 1998 |

## Bureau of Mine Reclamation

|  |      |
|--|------|
| McCullough Creek Uplands - Outstanding Upland Project                          | 1998 |
| Bienville Plantation - Outstanding Innovative Reclamation Project              | 1998 |
| McCullough Creek Headwaters - Outstanding Wetland Project                      | 1999 |
| Green Area Corridor - Outstanding Ecosystem Project                            | 1999 |
| Citrus on P-1 Reclaimed Clay Pond - Outstanding Innovative Reclamation Project | 2000 |
| Hardee Public Lakes and Wetlands - Outstanding Ecosystem Project               | 2000 |
| Hookers Prairie Sawgrass - Outstanding Wetland Project                         | 2000 |
| McNeill Lake - Outstanding Public Interest Reclamation Project                 | 2000 |
| SR-1 Pine Flatwoods - Outstanding Upland Project                               | 2000 |

## Tampa Bay Chapter, Florida Association of Environmental Professionals

|   |      |
|---|------|
| West Noralyn Scrub Habitat - Outstanding Habitat Creation | 1998 |
|---|------|

## References

1. The Florida Phosphate Industry: A History of the Development and Use of a Vital Mineral, Arch Fredric Blakey, Harvard University Press, Cambridge, Massachusetts, 1973.
2. Section 378.202(1), Florida Statutes.
3. Section 378.209, Florida Statutes.
4. Guiding Principles of the Florida Phosphate Council - Third Edition, 1999.
5. The Florida Phosphate Industry: A History of the Development and Use of a Vital Mineral, Arch Fredric Blakey, Harvard University Press, Cambridge, Massachusetts, 1973.
6. Blakey.
7. Florida Phosphate Council, 1999 data.
8. An Evaluation of Xeric Habitat Reclamation at a Central Florida Phosphate Mine, Office of Environmental Services, Florida Game and Freshwater Fish Commission, July 1992.
9. FIPR Publication No. 03-088-107. Polk County Mined Lands Agricultural Research and Demonstration Project. Edited by David B. Shibbles, Polk County and University of Florida IFAS. October, 1994. FIPR Publication No. 03-093-128. The Mined Lands Agricultural Research and Demonstration Project: Summary of Experiments and Extension Recommendations. E.A. Hanlon, R.A. Jerez and J.A. Stricker, University of Florida IFAS and Polk County. October 1996.
10. Kiefer, John, Vertebrate Utilization of Reclaimed Habitat on Phosphate Mine Lands in Florida: A Research Synopsis and Habitat Design Recommendations, Proceedings of 2000 National Meeting of the American Society for Surface Mining and Reclamation, Tampa, FL June 2000.

In addition to the Florida Phosphate Council and its member companies, other sources of reclamation information are: The Florida Institute of Phosphate Research, 863-534-7160, [www.fipr.state.fl.us](http://www.fipr.state.fl.us); and the Bureau of Mine Reclamation, 850-488-8217, [www.dep.state.fl.us](http://www.dep.state.fl.us).

**All photos are of mining activities and reclaimed land in Florida.**



*Native flatwoods  
vegetation is established  
on a young reclaimed site.*



phosphate  
feeds you

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